

Section 16.34.03 Construction Standards.

(1) Trail Surfacing. Wasatch County surfacing guidelines are provided for: Hard surface, soft surface ,and natural surface.

(a) Hard Surface Shared Use Paths (Asphalt). These trails are designed to accommodate the widest variety and highest volumes of users. These trails serve multiple functions by providing for alternative transportation and recreation purposes. Hard-surface trails should also meet ADA accessibility for the physically challenged. Usage can be year-round depending on the demand, location and environmental conditions.

(i) Surface Standards. Trail surface cross section of an Asphalt path would reveal the sub-grade, the sub-base, weed barrier matting and the trail surface.

1) The sub-grade is the native soil and must be thoroughly compacted prior to the addition of the sub-base.

2) Weed barrier matting (geotextile) must be used to sustain the life of the pavement.

3) The sub-base is the critical layer affecting the lifespan of the trail. This is a six (6) inch layer that must drain well, be kept dry and not contain clays or soils that expand when wet. This layer is a well-compacted layer of stone and rock.

4) The final asphalt layer is put down three (3) inch thick.

It is recommended that asphalt paths be sealed during the second year, which can expand the lifespan by double or triple.

(ii) Trail Width. Minimum width for average use, hard surface trails will be ten (10) feet

High use areas are encouraged to be ten (10) feet with an adjacent two to four (2-4) foot soft surface trail

Very high use areas will require a twelve (12) foot width

(iii) Drainage. No one element is more detrimental to a trail than water erosion. Proper drainage will extend the life of a trail and avoid needed maintenance two (2) or three (3) fold.

1) Surface Drainage requires a crowned outslope of two to five (2– 5) percent. The pitch towards the uphill side of the trail further require construction of a collection ditch. . Culverts, drainage gates and bridges may be necessary.

(iv) Grade. Optimal grade is less than five (5) percent, and should not exceed eight (8) percent.

(b) Soft Surface Path (Crusher Fines or Road Base). These trails should be located in areas that are not major transportation routes, but continue to see somewhat high level of use. Users include runners, walkers, cyclists, baby joggers or the like, and in some areas, equestrian and Nordic skiing. These can be used in four (4) season climates, although plowing is not encouraged. These paths are also accessible to some disabled users.

Crusher fines are crushed stone and include different particle sizes. Gravel and road base are not suitable replacements for crusher fines.

(i) Surface Standards.

1) Sub base is untreated and three-fourth ($\frac{3}{4}$) inch minus, compacted to ninety five (95) percent

2) Weed barrier matting is located between natural surface and finished surface

3) Finished surface is six (6) inches over graded dirt, or four (4) inches over two (2) inches of gravel

4) Consideration should be given to color of stone as to blend in with existing environment

(ii) Trail Width.

1) Range between six to ten (6– 10) feet.

2) Numbers of users and location should determine width

(iii) Drainage.

1) Outslope should be at least two (2) percent, but not exceed five (5) percent

2) Crowning will prevent water erosion and avoid long periods of standing water that will erode stability of crusher fines. In areas where standing water will be an issue, swells can be built to one or both sides of the trail or culverts can be installed.

3) Grade reversals that create low points to drain water should also be considered.

(iv) Grade.

- 1) Should avoid excess of five (5) percent.
- 2) Steep grades must be avoided on curves. If cyclists have to skid to make a turn, trail degradation will occur at a higher rate.

(c) Single Track (Natural Surface).

Natural surface, single-track trails are designed for low to moderate uses in backcountry areas. Users are typically runners, mountain bikers, hikers, and equestrians. Natural surface trails do not need to be engineered and are best built on a case-by-case basis giving due consideration to drainage, grade and natural terrain features.

(i) Surface and Width.

The original trail cut must be at least four (4) feet wide. The tread surface will compact and re-vegetate leaving a two (2) foot wide usable tread surface. Trails may be cut as wide as eight (8) feet creating a usable tread between two to six (2– 6) feet. Terrain and levels of expected use should determine width. The trail surface (tread) must be free of all organic material. All vegetation debris should be dispersed downhill of the tread and be noticeable to users. Corridor should be clear of all branches and tree stumps within two (2) feet of the tread surface. Full bench construction is required (diagram 2)

(ii) Grade.

Grades should not exceed ten (10) percent. Optimal grades are between five (5) and eight (8) percent. If grades exceed ten (10) percent, consideration must be given to the maintenance issues that may arise and the sustainability of the trail over time.

(iii) Drainage.

- 1) Outslope is two (2) percent or greater.
- 2) Rolling grade dips are the preferred water diversion feature (D. 3)
- 3) Knicks can also be used. These are six to ten (6-10) feet long and have a fifteen (15) percent Outslope (D.4)
- 4) Swells can be used where drainage is possible
- 5) Drain dips cannot be constructed on grades exceeding ten (10) percent
- 6) Water bars can be used in rare circumstances where terrain is prohibitive to above.
- 7) All topsoil removed to create the tread must be sidecast and dispersed.

(d) Switchbacks And Climbing Turns

(2) Trail Construction.

(a) Guarantee for Trail Construction.

Trail construction that is required as part of a development project will be subject to a security or bond that covers one hundred twenty (120) percent of the trail construction cost. This will be required at the same time the bonding is done for the other infrastructure requirements.

After completion of each trail, the developer shall warrant the workmanship and materials and construction of each trail for a period of two (2) years and shall provide a maintenance bond in the amount of ten (10) percent for the construction cost of each trail, which shall be in place for a period of five (5) years.

The developer shall pay inspection fees of one and one-half (1.5) percent of the estimated cost of public trail construction to Wasatch County upon application of the first grading permit or low impact development activity permit for construction of the trail system.

(b) Trail Easements.

All public trails will require a recorded easement. All trail easements shall be noted and defined on a plat map. Backcountry trails and some soft-surface trails will be recorded as built, but will be listed in the development agreement when receiving plat approvals from Wasatch County.

In some cases, a temporary trail easement and installation may be required. An example might be on a

large phased project where a trail exists but is to be relocated and dedicated in a future phase. In this case, a temporary trail easement is needed to access the existing trail until the future phase is constructed. Another example might concern a developer who has property that will not be developed until a future time. The developer may allow trail access on this property on an interim basis until the land is developed, which would require a temporary trail easement.

(c) Phasing.

When trails are part of a phased project, the phasing of various trail segments will follow a logical sequence for trail users. For example, some trail construction may be required through an entire project to provide completed trail connections at an early phase in the project. This will be considered on a case-by-case basis.

(d) Measures to Reduce Trail Construction Impacts.

As stated previously, a good site selection for your trail will prevent most construction impacts. Water drainage and erosion must first be addressed during the trail location phase, allowing for the use of natural features to be incorporated into the trail design. The following may or may not be required for trail construction.

(i) In ecologically sensitive areas, temporary fencing may be used to protect these features.

(ii) Trails located near wetlands, may require boardwalk style construction.

(iii) If using machinery to cut the trail, the right size equipment must be used. Different products are available specific to trail construction needs.

(iv) If building near waterways or critical run-off points trail layout will need to be reviewed on a case-by-case basis. Erosion matting or other device may be required for construction.

(v) In visually sensitive areas, work with hand tools may be necessary to reduce visual impacts.

(vi) Indigenous materials should be used to the greatest extent possible for construction and re-vegetation practices. Seed mixes should be native; rock retaining walls should use naturally occurring materials if available; and care should be taken to not introduce non-native materials into construction areas.

(vii) Re-vegetation should occur quickly after construction dependent on the location, season and availability of water. Use of a native seed mix will be necessary. Trees and shrubs will need to be replaced if removed for construction purposes. For recommended seed mix and native vegetation please contact: Utah State University Extension Service, Wasatch County Branch, 55 South 500 East, Heber City, UT 84032

(3) Trailheads.

Trailheads generally provide four essential purposes: signing, off street parking, restroom facilities and trail access. Any access into the trail system is considered a trailhead. New development including public trails must consider how the public will get to these facilities and how it will coordinate with other plans in the development. Trailheads should be visible, easily accessible and designed to accommodate the type of trail uses allowed. Equestrian trails will require more space than hiking or biking only trails for trailer parking and maneuvering.

Restroom facilities must be considered for all trail access points. Restrooms will be required at some locations. In some circumstance it may be possible to share existing public facilities.

Two (2) types of signing may be necessary. Standard trailhead signs that indicate the trail being accessed should be located at all trailhead facilities. Signing will also include a good trail map, allowed uses, and trail rules. Please refer to the section on signing for more specific details on trail signs.

(4) Bridges.

Bridges can be a great attraction for trail users and most likely highlight a scenic vantage point. In Wasatch County bridges may be used to span rivers, streams, canals, roadways, and steep topographic features.

Two (2) design types can be used: custom made or a factory built steel truss. Both styles have advantages and disadvantages and some general recommendations have been made here.

A custom bridge will use treated lumber that is resistant to decay for long-term durability. A typical custom bridge span is less than twenty to twenty five (20– 25) feet. Longer spans for low bridges can

be formed using piers, creating the aesthetically desirable possibility of aligning the bridge on a curve. Factory built bridges should be used for clear spans over twenty to twenty five (20– 25) feet. These bridges can be ordered in any length and width, with several competing manufacturers. Decks can be wooden or concrete and all engineering is done by the manufacturer.

(a) General Design Features:

(i) Width of bridge should be the equivalent of the trail. This refers to the usable width of the bridge and does not consider construction requirements.

(ii) Bridge alignments should allow for adequate sight distances and where possible be constructed to avoid the need for users to make sharp turns at either end of the bridge.

(iii) Railings are required if the decking is farther than thirty (30) inches above the feature being spanned.

Railings should be fifty four (54) inches high, with railings spaced not greater than fifteen (15) inches (if drop-offs are hazardous this is limited to four (4) inches spacing).

(iv) All exposed bolt and screw heads should be countersunk to be flush with the wood surface.

(v) Breakaway design features must be used if the bridge is constructed in an area prone to flooding.

(vi) The design must be structurally sound and approved by a licensed engineer. Design must factor in both live and dead load.

(vii) Design and materials should fit in with surrounding development.

(viii) Contact with State of Utah Division of Water Rights, Army Corp of Engineers and Wasatch County engineer may be necessary, depending on location.

(5) Fencing.

Fencing should be installed only where physical separation is necessary for safety and/or to preserve adjacent landowner privacy. Fences should not create a narrow corridor effect for long stretches along the trail. Where possible fencing should be located only on one (1) side of the trail at a time.

Fences should be no closer than five (5) feet from the trail edge and must also be located within the trail easement. Where fences are necessary along both sides of a trail, the minimum width should be twenty (20) inches as is consistent with the required trail easement.

Gates are required for trails that cross stock grazing areas. Said gates will be a self-closing lever latch type.

(6) Signing.

The signing standards include three (3) types: Informational, Regulatory and Interpretive. All types should be straightforward and simple to read and understand.

(a) Informational Signs at Trailheads.

These signs are primarily located at trailheads or areas where the user may experience a change in the trail experience. These signs should be located in such a way as to not interfere with the trail surface but be accessible to the users.

(b) Interpretive Signs

These signs benefit the users by explaining some feature available on the trail route. The features may include, historical, biological, natural resources, of cultural facts about an area. Often these signs are educational and will serve to relay management goals of an area. These must be located in appropriate areas.

(c) Regulatory Signs

The following are some of the signs likely to be needed, along with their identification number and size. Some unusual signs may have to be custom made. These examples are taken from the Manual on Uniform Traffic Control Devices, December 2000 edition (MUTCD). The MUTCD should be referenced for complete signing standards.

(d) Stop and Yield warnings.

(i) STOP signs are intended for use where bicyclists are required to stop.

(ii) YIELD signs shall be installed on shared use paths at points where bicyclists have an adequate view of conflicting traffic as they approach the sign and where bicyclists are required to yield to the right-of-way. The visibility of approaching traffic must be adequate to permit the bicyclist to stop or take other measures to avoid

that traffic.

(iii) STOP AHEAD and YIELD AHEAD signs should be used where an intersection cannot be seen on approach. They may also be used to emphasize the right-of-way at busy or dangerous intersections.

(iv) DRIVEWAY CROSSING should be used where a driveway crossing cannot be seen on approach. This sign can also emphasize busy or potentially dangerous driveway crossings.

(e) Unexpected or hazardous conditions warnings.

These should be used only when necessary to warn of unexpected or potentially hazardous conditions.

The signs should be placed at least fifty (50) feet before the hazard.

(f) Turn and curve warnings.

If the trail changes direction unexpectedly and the change is not readily apparent on approach, use appropriate turn or curve signs to warn bicyclists. They should normally be installed no less than fifty (50) feet in advance of the beginning of change of alignment.

(7) Sign Construction Features (Sample Bollards and Mile Markers)

(a) Sign Posts: There are many design solutions to signage along a trail; below is one (1) commonly used design.

Post location will conform to the standards set forth in the MUTCD section on ‘Traffic Control Devices for Bicycle Facilities.’ Signposts will be four by four (4x4) pressure-treated Douglas Fir, embedded into the ground a minimum of twenty four (24) inches unless other materials are specifically approved.

(b) Attachment Systems: Signs should be attached to wood posts with three-eighths (3/8) inch diameter galvanized carriage bolts in a minimum of two (2) locations per post.

(c) Sign Bollards: These should be located at all trail access points. Posts should be constructed of Redwood or pressure treated Douglas Fir.

Different styles for sign bollards are depicted in the figures ‘A’, ‘B’, and ‘C’. Style ‘A’ and ‘B’ should be located at trailhead facilities. Style ‘A’ is for all named trails or designated access points.

Style ‘C’ is for all other access points and can be used in conjunction with plain bollards where motorized access is restricted, or modified for use as trail mile markers. The individual symbols are three (3) inches square reflective decals that can be ordered from Carsonite International. They should be mounted on heavy gauge aluminum plate routed into the post a minimum of two (2) inches and epoxied into place.